

REMARKS

Please reconsider the application in view of the above amendments and the following remarks. Applicant thanks the Examiner for carefully considering this application.

Claim of Priority

Applicant respectfully requests that the Examiner acknowledge the claim of foreign priority. The present application is a continuation of Japanese application 2003-015142 filed on January 23, 2003.

Drawings

Applicant respectfully requests that the Examiner accept the drawings submitted on May 5, 2004. Applicant submits that these drawings are formal.

Disposition of Claims

Claims 1-8 are pending in the present application. Claim 1 is independent. The remaining claims depend, directly or indirectly, from claim 1.

Claim Amendments

Claims 1, 2, 5, 6, and 8 have been amended by way of this reply to correct minor errors. No new matter has been added by way of these amendments.

Rejection(s) under 35 U.S.C § 102

Claims 1-7 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,061,240 issued to Butterbaugh *et al.* (hereinafter "Butterbaugh"). For the reasons set forth below, this rejection is respectfully traversed.

The present invention is directed to a mounting structure of a ball grid array ("BGA") type integrated circuit ("IC"). As discussed with reference to Figures 1A and 1B of the present application, a mounting structure of a BGA type IC 1 in accordance with an embodiment of the present invention includes a pair of resin guide ribs 4 and a pair of height adjusting ribs 7. Guide ribs 4 on a bottom surface of a body portion 2 of the BGA type IC 1 fit into locking holes 5a of board 5, so that lower ends of height adjusting ribs 7 abut on a top surface of the board 5. Height adjusting ribs 7 adjust the BGA type IC 1 to a predetermined height relative to board 5. Further, springs 6 prevent the BGA type IC 1 from being strongly pressed against board 5 (*see, e.g., Specification, page 7, line 18 – page 8, line 15*). In another embodiment of the present invention, elastic pieces 4b (instead of springs 6), provided on guide ribs 4, prevent the BGA type IC 1 from being strongly pressed against board 5 (*see, e.g., Specification, page 9, lines 5-15*).

Further, as discussed with reference to Figures 4A-5B of the Specification, in one or more embodiments of the present invention, an anti-rubbing pin 8 may be provided on one or more corners of a BGA type IC 1. The anti-rubbing pin(s) 8 protrudes downward and is inserted into an insertion hole 5b of board 5 when the BGA type IC 1 is mounted on board 5. This structure prevents the BGA type IC 1 from being rubbed against the board 5. Additionally, anti-rubbing pin(s) 8 may be used to provide a correct orientation for BGA type IC 1 when it is mounted on board 5 (*see, e.g., Specification, page 10, line 16 – page 11, line 5*).

Accordingly, amended independent claim 1 requires: (i) resin guide ribs provided on opposite sides of a body portion of the BGA type IC and (ii) height adjusting ribs provided at places slightly inwardly distant from the guide ribs respectively so as to protrude from the body portion, where the height adjusting ribs adjust the BGA type IC to a predetermined height relative to the board. Amended independent claim 2 requires elastic bodies provided on the

guide ribs where the elastic bodies prevent the BGA type IC from being strongly pressed against the board when the BGA type IC is mounted on the board. Amended independent claim 5 requires a pair of anti-rubbing pins to be fitted into insertion holes provided in the board that are provided on diagonal corners of the bottom surface of the body portion (of the BGA type IC) respectively so as to protrude downward. Amended independent claim 6 requires at least one anti-rubbing pin to be fitted in an insertion hole provided in the board that is provided on the bottom surface of the body portion (of the BGA type IC) so as to protrude downward.

Butterbaugh does not show or suggest at least the above limitations of the present invention. In contrast to the present invention, Butterbaugh is directed to a heat sink and a method for securing a heat sink to a circuit board. It is clear that the push pin assembly 34 of Butterbaugh attaches heat sink 32 directly to circuit board 16 (see Butterbaugh, col. 4, lines 14-26). Butterbaugh does not even address the issue of mounting a BGA type IC to a circuit board. Butterbaugh merely discloses, as shown in Figure 3 of Butterbaugh, that modules 16 are mounted to the top surface of the circuit board 16 by melting or reflowing the solder of the leads 30 to form an electrical connection and a mechanical attachment between each lead 30 and its corresponding contact pad 28 (see Butterbaugh, col. 3, line 58 – col. 4, line 7). As Butterbaugh does not contemplate mounting a BGA type IC to a board with a pin, Butterbaugh necessarily cannot contemplate proper orientation of a BGA type IC mounted on a board.

Further, Butterbaugh fails to disclose height adjusting ribs as required by the claimed invention. Butterbaugh is completely silent with respect to height adjusting ribs as required by amended independent claim 1. Further, Butterbaugh is completely silent with respect to elastic bodies as required by amended independent claim 2 and one or more anti-rubbing pins as required by amended independent claims 5 and 6.

In view of the above, Butterbaugh fails to show or suggest the present invention as recited in amended independent claims 1, 2, 5, and 6. Thus, amended independent claims 1, 2, 5, and 6 are patentable over Butterbaugh. Dependent claims are allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Rejection(s) under 35 U.S.C § 103

Claim 8 was rejected under 35 U.S.C. § 103(a) as being obvious over Butterbaugh. For the reasons set forth below, this rejection is respectfully traversed.

As discussed above, the present invention is directed to a mounting structure of a BGA type integrated circuit (IC). Accordingly, amended independent claim 6 requires at least one anti-rubbing pin to be fitted in an insertion hole provided in the board that is provided on the bottom surface of the body portion (of the BGA type IC) so as to protrude downward.

The Examiner asserts it would have been obvious to one of ordinary skill in the art to modify the pin with a square shape as Applicant has not disclosed that the shape of the pin of claim 8 provides an advantage, is used for a particular purpose, or solves a stated problem. Applicant respectfully disagrees. Applicant respectfully notes that the language of claim 8 discloses a purpose, *i.e.*, the pin serves as an orienting pin and a positioning pin. Further, as clearly described in the Specification, the square shape of the pin permits the BGA type IC 1 to be oriented properly relative to the board (*see* Specification, page 11, line 9 – page 12, line 6). Thus, the limitations of claim 8 would not be obvious to one skilled in the art from the teachings of Butterbaugh.

Further, as discussed above, Butterbaugh clearly does not show or suggest the present invention as required by amended independent claim 6. Thus, amended independent claim 6 is


patentable over Butterbaugh. Dependent claim 8 also is allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Conclusion

Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 04995/132001).

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Respectfully submitted,

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